25X1

Page Denied

Approved For Release 2008/11/17 : CIA-RDP80T00246A001500390002-1

STAT

MEASUREMENT OF FLUID FLOW

STAT

OBSERVATIONS OF THE U.S.S.R. TO THE SECOND PROPOSED WORDING FOR AN INTERNATIONAL STANDARD FOR MEASUREMENT OF FLUID FLOW BY MEANS OF ORIFICE PLATES, NOZZLES AND VENTURI TUBES,

STAT

- - - - - - - - - - - - -

I. The International Standard for measurement of fluid flow is a document of a very great value and need. The composition of such a Standard required a summarization both of the results of investigations made in various countries, and of the materials contained in National Standards. This remarkable work was successfully carried out by Messrs A. SCHLAG and J. STOLZ, who also made some very original and important supplements.

2. In considering the draft of the standard the delegation of the USSR took as a base the following general ideas :

20. The basic (obligatory) material of the Standard should include not only the acceptance tests and the contestable (arbitration) measurements, but in the first place the industrial measurements (see Resolution n° 5, ISO/TC 30 (Paris 1954-4)89, and Resolution n° 7, ISO/TC 30/WG 2 (Paris 1954-3)21).

That is why the obligatory text of the Standard should be brief and at the same time as clear as possible.

In industrial measurements the methods of computation of errors should be as simple as possible and that is why in some cases the strict mathematical rules may not be taken into consideration.

The strict methods of computation are only necessary for extremely precise measurements (e.g. in investigations, acceptance tests, contestable measurements, etc.).

.../

STAT

STAT

21. The basic parameters, symbols, terminology, the units of measurement and their designations adopted in the Standard should correspond to the International Standards or agreements.

22. The material given in the Standard should be quite complete and sufficient for the computation and measurements in considered branch.

23. The basic (obligatory) text of Standard may include only such materials whose reliability and correctness is indisputable.

The material less correct but having a wide practical interest (e.g. the data on measurement of pulsating flow, of flow with low Reynolds numbers, etc.) should be given in the appendix to the Standard. This appendix should also include some theoretical conclusions concerning the methods of computation adopted in the Standard (see resolution n° 11, ISO/TC 30/WG 2 (Paris 1952-2) 5).

24. The Standard, being a summary of a great number of studies, needs to be accompanied by a special note containing the explanation to the adopted proposals, coefficient values, methods of computation, etc.

This material is necessary for a true orientation during the examination of the Standard and for the further developments in this branch.

Thus taking into account the foregoing general considerations the following recommendations to the proposed standard can be given :

4. General

400. The text of the Standard should be divided into 3 parts :

1) The obligatory part containing reliable and correct materials ;

2) Appendix n° I covering the main theoretical conclusions concerning the accepted methods of computation and the examples of computation.

3) Appendix n° 2 containing the material on special cases of measurement of fluid flow having a great practical importance and based on sufficient data (the orifices and nozzles at the inlet and outlet of pipe ; segmental orifices, orifices for $D < 50$ mm ; measurements with low Reynolds numbers ; of pulsating flow ; at supercritical pressure ratios, etc.). It would also be desirable to give typical recommended designs of primary elements for different mediums and pressures, especially, for a high pressure steam ($P_y > 200$ kgf/cm^2).

401. Referring to the orifice with "Vena Contracta" and flange taps, as shown in some recent investigations (e.g. see Prof. RAMPONI, Energia Electtrica, 1953, vol. XXX, N° 7, Dr HERNING, BWK, 1956, n° 3 and Dr CLARK, Trans. Soc. of Instr. Techn. 1952, vol. 4, n° 4), there is still some disaccord concerning both the experimental development of the coefficient and the installation and operational data. For example, the conclusion made by Prof. RAMPONI concerning the identical influence of pipe line roughness and of orifice edge sharpness in different systems of taps makes doubtful the accuracy of discharge coefficients for "Vena Contracta" taps and flange taps given in the draft of the Standard. According to Dr HERNING's data the section "Vena Contracta" is nearer to the orifice than it is indicated in the draft of the Standard.

.../

 STAT

It should be mentioned, that the accuracy of discharge coefficients for "Vena Contracta" taps and flange taps stipulated by the draft cannot be maintained in industrial measurements, using flowmeters, with the scale graduated in units of discharge, because the coefficients are a function of Reynolds' number (i.e. of the discharge).

Thus, for example, if D = 350 mm and $\frac{d}{D} = 0{,}7$, the trebling of Reynolds number from $Rd = 5.10^5$ to $Rd = 15.10^5$ will reduce the discharge coefficient of the orifice with "Vena Contracta" taps by about 0,5 per cent and of the orifice with flange taps by 0,7 %, while the coefficient of the orifice with corner taps remains constant.

In this connection and taking into account the fact that the orifices with "Vena Contracta" taps and flange taps are included in most of the national standards, it is not possible to recommend their introduction into the obligatory text of the standard until the exhaustive studies of these orifices are carried out.

402. It is recommended, besides the accurate methods of computation of the primary elements by means of successive approximations to give a graphical-analytical method of computation as the most simple method (e.g. see "The Rules n° 27-54 for the application and control of the flowmeters with standard orifices, nozzles and Venturi tubes", published in the U.S.S.R., 1955).

1) It would be desirable to set forth the methods of computation of the primary elements which are to be used during the fabrication of industrial flowmeters which form a set with the primary elements, taking into account the resolution n° 4 ISO/TC 30/WG 2 (Paris 1954-3) 19.

2) To set forth the methods of computation based on the given values of discharge and permissible loss of pressure.

403. It is necessary to introduce into the standard the following data :

4030. Diagrams and nomographic charts for computation (see above mentioned Rules n° 27-54).

4031. Formulae for the determination of differential pressure in the lines with sealing and condensation chambers.

4032. Data concerning the diameter, length and schemes of the pressure pipes.

4033. The methods of the determination of the loss of pressure for different types of primary elements.

4034. The tables of values of isentropic exponent, specific gravity, compressibility coefficient of the most wide-spread real (industrial) gases, and all other necessary reference - data, like that contained in DIN 1952 and the Rules n° 27-54.

4035. Examples of computation of orifices with corner taps.

.../

STAT

404. In composing the tables of coefficients it should be taken into consideration that the error of approximation of table data should not exeeed a certain fraction (e.g. 0.10 ÷ 0.25) of the root mean-square error of the result of the experiment.

405. All the numerical values should be given in the metric system.

It is to delete the designation of the unit of pressure "Pasçal", which is not adopted in the international agreements.

406. It is to substitute the designations β, β^2 and β^4 by the designations $\sqrt{m}$, m and m^2 adopted in the most of the countries and to give all the tables of coefficients for rounded values of m (instead of β^4). It is recommended to designate the differential pressure by Δp.

407. In the computation and tables for orifices and nozzles with corner taps only the Reynolds number R_D should be used. Beside that, it is recommended that the code will contain a table showing the correspondence between R_D/R_d (see the resolution 10, ISO/TC 30/WG 2 (Paris 1952-2) 5).

408. It would be desirable besides the general formula of computation to give the working formulae with numerical coefficients for the typical cases of industrial measurements.

409. It is recommended to give an objective method of quantitative evaluation of the sharpness of the edge (§ 6 12 2) based, for example, upon the dependence of the blunting of the edge and the reflection by this edge of the light beam having a certain wavelength. In the case of adopting the method recommended in § 6162, it is expedient to add that the edge must be illuminated by diffused light at an angle of incidence of about 45°.

410. It is recommended to stipulate the quality of the primary elements (see §§ 6122, 6132, 6151, 6247, 7129, etc.), by the indication of certain quantitative characteristics according to the recommendations of ISO / TC 57.

411. It is recommended to give more specific indications (instructions) concerning the dimensions of the thermometric well (§ 6342). The distance between the well and the orifice plate recommended by the standard is evidently too small. (see DIN, 1952).

412. It is very difficult practically to fulfil the requirement of § 6241 in case of the installation of an orifice plate without piezometer rings installed between the flat welded flanges. Thus, for pressure taps with diameter less than 0.02 D it is expedient to allow some displacement of their axes so that the distance between the most distant point of the tap (on the inner surface of the pipe) and the orifice plate does not exceed 0.02 D.

413. While drilling the hole in the flange, it is quite impossible to maintain the angle about 90° (§ 6245).

.../

STAT

414. It is expedient (from the point of view of construction) to allow also to have pressure taps made as annular slits openings (§ 8142). It is necessary to supplement the standard by an explanatory note containing the following points :

4150. The reason for omitting the correction factor for the lack of sharpness of orifice edge.

4151. The basis for the empirical formulae, indicated in §§ 6323, 6422 and 7182.

4152. The basis for recommendation of identical length of straight pipe-sections for orifice plates with and without piezometer rings having different pressure taps (§ 6313).

4153. The reason of discrepancy of the limiting Reynolds numbers (6411) and discharge coefficients (§ 6412) with data published before and adopted by national Standards. It is necessary to explain :

a) why the value of discharge coefficient is given with 4 decimals, (instead of 3 as before)

b) why the coefficients for $D \geqslant 300$ at $m = 0.1$, 0.2, 0.3 and 0.4 (table n° 6412) differ from corresponding values adopted before.

4154. The basis for the data given in the table n° 6421 (this is a matter of a great importance, because the values given in the table differ considerably from those generally adopted).

5. Comments on § 9 "Errors"

50. The theory of errors developed in the draft is much more advanced in comparison with the data given in national Standards.

The principal idea of this theory - the splitting up of q_m into elementary quantities - is indisputable and the only true one. However, the text of this section given in the draft will be difficult for understanding due to the fact that some intermediate conversions are omitted and the symbols used differ much from those which are usually applied in mathematics.

Besides this, the general and strict theory taken for industrial measurements (see § 20 of these comments) will be too complicated and unnecessary. It is expedient to introduce some possible simplification for this case (see also resolution 3, ISO/TC 30/WG 2 (Paris 1954-3) 19).

Thus, taking into consideration the foregoing, the following recommendations could be given concerning § 9.

51. It should be necessary for industrial measurements to introduce in the basic text the simplified method of computation of the root mean square errors. The methods of computation should be given in such a way as if all of the quantities on the right hand side of the formula :

.../

STAT

$$q_m = \alpha \, \varepsilon \frac{\pi d^2}{4} \sqrt{2 \Delta \rho_1}$$

were considered as independent quantities and the relative root mean square error q_m must be computed according to the formula (see also the rules n° 27-54) :

$$\sigma q_m = \sqrt{\sigma_\alpha^2 + \sigma_\varepsilon^2 + 4\sigma_x^2 + \frac{1}{4}\sigma_\Delta^2 + \frac{1}{4}\sigma_{\rho_1}^2}$$

52. It is expedient to describe in the supplement to the standard the strict general theory of errors given in the Standard.

This description must be more detailed and clear without any misunderstanding, which may arise due to the briefness of the text. Besides that, it is useful to apply this general theory ih two particular cases :

a) the measurement by means of orifices with corner taps when Reynolds numbers are greater than the limiting values, e.g.

$$\frac{\partial \alpha}{\partial R_d} = 0$$

b) the measurement by means of orifices with flange taps, when the discharge may be expressed as an explicit function of independent quantities. In both indicated cases the formulae for elementary errors are considerably simplified. It should be noted that all the formulae of general theory are necessary for the orifice "Vena Contracta" only.

As to the comparatively inaccurate measurement by means of the orifices with corner taps when Reynolds number is less than the limiting velue, the general theory is formally necessary, but in fact an approximate theory can be used (§ 51), including the additional error which takes into account the correction factor for Reynolds number.

53. As to the text of the general theory of errors the following version may be proposed.

The root mean square deviation of flow is defined by the formulae (using the symbols, adopted in the Standard) :

$$\delta q = \sqrt{\left(\frac{\partial q}{\partial X_1} \delta X_1\right)^2 + \left(\frac{\partial q}{\partial X_2} \delta X_2\right)^2 + \dots \left(\frac{\partial q}{\partial X_i} \delta X_i\right)^2 + \dots} \quad (1)$$

where X_1 , X_2 ... X_i are independent quantities given in the equation :

$$q = q\,(X_1, X_2, \dots X_i, \dots) \qquad (2)$$

The working formula for determining flow by mass is :

$$q_m = \alpha \, \varepsilon \frac{\pi}{4} d^2 \sqrt{2 \Delta \rho_1} \qquad (3)$$

.../

STAT

This formula may be expressed as follows :

$$q_m = f\left\{\begin{array}{l}
\alpha\left[\begin{array}{l}
\beta(d_{t_o}, D_{t'_o}, \gamma_d, \gamma_D, t_1, t_o, t'_o) \\
D(D_{t_o}, \gamma_D, t_1, t'_o) \\
R_d(d_{t_o}, \gamma_d, t_1, t_o, p_1, E_\gamma, q_m) \\
E_\alpha(E_\alpha)
\end{array}\right] \\
\varepsilon\left[\begin{array}{l}
\beta(d_{t_o}, D_{t'_o}, \gamma_d, \gamma_D, t_1, t_o, t'_o) \\
\Delta(\Delta) \\
p_1(p_1) \\
\varkappa(p_1, t_1, E_\varkappa) \\
E_\varepsilon(E_\varepsilon)
\end{array}\right] \\
d^2\left[d(d_{t_o}, \gamma_d, t_1, t_o)\right] \\
\sqrt{\Delta}\left[\Delta(\Delta)\right] \\
\sqrt{\rho_1}\left[\rho_1(p_1, t_1, E_{\rho_1})\right]
\end{array}\right\} \qquad (4)$$

The quantities on the righthand side of the formula (4) are independent except q_m which is included in R_d and is a function of all other independent quantities.

The partial derivatives in relation to independent quantities X_i upon which the quantity q_m depends should be computed by differentiation of

$$q_m = f\,(q_m, X_1, X_2, \ldots X_i \ldots)$$

as an implicit function.

.../

STAT

For instance, for the derivative $\frac{\partial q_m}{\partial d_{t_o}}$ (*)

we obtain the following expression :

$$\frac{\partial q_m}{\partial d_{t_o}} = \frac{\partial f}{\partial \alpha}\frac{\partial \alpha}{\partial \beta}\frac{\partial \beta}{\partial d}\frac{\partial d}{\partial d_{t_o}} + \frac{\partial f}{\partial \alpha}\frac{\partial \alpha}{\partial R_d}\frac{\partial R_d}{\partial d}\frac{\partial d}{\partial d_{t_o}} + \frac{\partial f}{\partial \varepsilon}\frac{\partial \varepsilon}{\partial \beta}\frac{\partial \beta}{\partial d}\frac{\partial d}{\partial d_{t_o}} + \frac{\partial f}{\partial d^2}\frac{\partial d^2}{\partial d}\frac{\partial d}{\partial d_{t_o}} + \frac{\partial f}{\partial \alpha} + \frac{\partial \alpha}{\partial R_d}\frac{\partial R_d}{\partial q_m}\frac{\partial q_m}{\partial d_{t_o}} \;;$$

whence

$$\frac{\partial q_m}{\partial d_{t_o}} = \frac{\frac{\partial f}{\partial \alpha}\frac{\partial \alpha}{\partial \beta}\frac{\partial \beta}{\partial d}\frac{\partial d}{\partial d_{t_o}} + \frac{\partial f}{\partial \alpha}\frac{\partial \alpha}{\partial R_d}\frac{\partial R_d}{\partial d}\frac{\partial d}{\partial d_{t_o}} + \frac{\partial f}{\partial \varepsilon}\frac{\partial \varepsilon}{\partial \beta}\frac{\partial \beta}{\partial d}\frac{\partial d}{\partial d_{t_o}} + \frac{\partial f}{\partial d^2}\frac{\partial d^2}{\partial d}\frac{\partial d}{\partial d_{t_o}}}{\left(1 - \frac{\partial f}{\partial \alpha}\frac{\partial \alpha}{\partial R_d}\frac{\partial R_d}{\partial q_m}\right)}$$

The expression $\frac{\partial q_m}{\partial d_{t_o}}$ differs from the same expression given in the standard in the denominator :

$$\left(1 - \frac{\partial f}{\partial \alpha}\frac{\partial \alpha}{\partial R_d}\frac{\partial R_d}{\partial q_m}\right)$$

The other partial derivatives are of the same type.

Thus, the partial derivatives of q_m in relation to independent quantities X_i will be as follows :

$$\frac{\partial q_m}{\partial X_i} = \frac{\frac{\partial f}{\partial X_i}}{1 - \frac{\partial f}{\partial \alpha}\frac{\partial \alpha}{\partial R_d}\frac{\partial R_d}{\partial q_m}}$$

Then the root mean square error is :

$$\delta q_m = \sqrt{\frac{1}{\left(1 - \frac{\partial f}{\partial q_m}\right)^2} \sum \left(\frac{\partial f}{\partial X_i}\;\delta X_i\right)^2}$$

or

$$\delta q_m = \frac{1 + \frac{\partial f}{\partial q_m}}{1 - \left(\frac{\partial f}{\partial q_m}\right)^2} \sqrt{\sum \left(\frac{\partial f}{\partial X_i}\;\delta X_i\right)^2}$$

.../

(*) The symbols of the Standard are used here (see however, § 54 of these comments

 STAT

Omitting the term $(\frac{\partial f}{\partial q_m})^2$ we obtain $\delta q_m = (1 + \frac{\partial f}{\partial q_m})\sqrt{\sum(\frac{\partial f}{\partial X_i}\delta X_i)^2}$

or, using the symbols adopted in the Standard :

$$\delta q_m = (1 + \frac{\partial q_m}{\partial anp} \sqrt{\sum(\frac{\partial q_m}{\partial X_i}\delta X_i)^2}$$

In spite of the fact that the final result is the same as that in the Standard, it is to recommend the method mentioned above which is expressed in generally used symbols and no misunderstandings will arise.

54. The designations in the table of partial derivatives (§ 9232) though they have been mentioned in § 92323 are so different from those adopted in the mathematics that they cannot be admitted. It would be better to have a more detailed text with usual symbols, that is :

$$\frac{\partial q_m / q_m}{\partial d\ t_c / d\ t_o} \quad \text{etc.}$$

It is also not clear why the usual designation of the root mean square "σ" is not used.

55. It is not expedient to recommend for all cases of measurements the 95 % probability which corresponds to the error of 2 σ. It would be more desirable to give indications concerning the computation of σ only ; the probability and the corresponding error is to be chosen by the user of the standard.

56. Derivatives $\frac{\partial \varepsilon}{\partial \beta}$; $\frac{\partial \varepsilon}{\partial p_1}$; $\frac{\partial \varepsilon}{\partial \varkappa}$; $\frac{\partial \varepsilon}{\partial \Delta}$ are formally not equal to zero but practically they only slightly differ from zero. In any case the accuracy of nomographs and tables for determining ε cannot be considered adequate to justify the use and computation of elementary errors which include these derivatives. It is why it would be more expedient to take into account these elementary errors by means of increasing the value E_ε .

It would additionally simplify the computation of total error.

On the other hand, a term, taking into account (in industrial measurements) the deviation of ε at different points of the flowmeter scale in relation to the mean value of ε adopted for the computation, is to be introduced.

57. The symbols E_α , E_ε etc. and $\frac{\partial q_m}{\partial E_\alpha}$, $\frac{\partial q_m}{\partial E_\varepsilon}$ etc. are unsuitable. The usual root mean square values σ_α, σ_ε etc. based on experimental data, should be introduced.

58. The text of § 9224 is to be discussed.

Indeed, if $z = x + y$, and $y = f(x)$, then $\sigma_z = (1 + \frac{\partial y}{\partial x})\sigma_x$.

.../

STAT

If we admit that $\sigma'_z = \sqrt{\sigma'^2_x + \sigma'^2_y}$ then, depending upon the choice of $\left[\sigma_y\right]_1$ it might be that $\sigma_z > \sigma'_z$ or $\sigma_z < \sigma'_z$

6. Individual comments

60. The following individual comments concerning the considered standard can be made.

601. § 232 : a) The text of the first paragraph on page 5 is not clear.

b) The diameter of the downstream section of the pipe should be measured, but not visually inspected.

602. § 3 : It should be indicated that the temperature is a quantity having a dimension.

603. § 434 : a) There is a printer's error in the second column of the table 434 (it is to be read x = 1.10)

b) There is a mistake in the formula in the headline: The sign of equality preceeding the last term is not clear ; two exponents are erroneously given as multipliers.

604. § 439 : The symbol α is omitted in the formula of the first paragraph.

605. §§ 5431, 5432 and 5433 are unnecessary ; the cases mentioned are not interesting for the measuring technique.

606. § 6121. The given tolerance for the unperpendicularity of the orifice face (1 %) is exaggerated and can be reduced.

607. §§ 6193, 6194 and 6195 are not the subjects of this standard and should be deleted.

608. § 6202 is not necessary : the term "primary element" also includes pressure taps (see § 1.0 of the Standard)

609. § 6221 : The position of pressure taps (separately for fluids and gases) should be indicated.

610. § 6248 : This requirement has no basis and is too strict.

611. § 631 : Is unnecessary as it repeats the description of the tables of coefficients.

612. § 7132 : is set forth unclearly.

.../

Approved For Release 2008/11/17 : CIA-RDP80T00246A001500390002-1

STAT

7. General conclusion

70. It is recommended to complete the standard as soon as possible taking into consideration the foregoing comments for approving it as an international standard.

-:-:-:-:-:-:-

STAT

Page Denied

Next 22 Page(s) In Document Denied

draft glossary UNCODED

STAT

-.-.-.-.-.-.-.-.

Note: The numbers given in parenthesis refer to the item number in the draft glossary, Document 4

FOREWORD
(Not yet reviewed)

A. GENERAL TERMS

1. General

Open Channel: A channel in which the stream has a free surface (2.57)

Stream: The liquid flowing in an open channel (new term)

Calibration The experimental determination of the relationship between a physical quantity and the indication of the instrument or device which measures it. (2.7)

Rating A form of calibration (2.87)

Spot measurement: A single and random measurement of a stream as distinguished from a systematic and continuous record (2.108)

The following terms were considered as part of this section and it was agreed that they should be omitted:-

2.53 Indicator

2.68 Meter

2.7 Calibrating

2.92 Recorder

2.94 Register

2. Mensuration

a) Vertical distances

Bench mark. A permanent point on a monument or a permanent structure or stable natural object, whose elevation above a datum is known, and which is used as a point of reference in the determination of elevation of other points (2.3)

STAT

Permanent gauge: A scale where position is fixed for reading liquid surface levels (2.73)

Stage: The elevation of the surface of a stream relative to a reference datum (new term)

Gauge (Gage): A device installed at a gauging station for indicating or recording the elevation of the surface of a stream (2.46)

Gauge datum: The elevation of the zero of the gauge relative to a reference datum (2.43)

Staff gauge: A graduated scale on a staff, plank, metal plate, peer, wall etc. partly submerged, on which the elevation of a liquid surface may be read (2.109)

Inclined Staff gauge: A staff gauge on a slope graduated to read vertical heights (2.52)

Mean monthly gauge Gauge height or liquid level averaged over a calender month (2.62)

Chain gauge (Tape gauge): A device for the measurement of the changes in surface level of a stream, consisting essentially of a tagged or indexed chain or tape, one end of which is weighted and lowered to the surface while one of the tags or indexes is read against a fixed graduated staff. The graduated staff is commonly mounted horizontally and to allow reading in this position the chain or tape passes over a pulley. The device is a convenient one for use on bridges.

Gauge well (Stilling well) : A chamber or compartment with closed sides and bottom except for a comparatively small inlet or inlets communicating with the river or canal. Its purpose is to permit the measurement of mean liquid levels by damping out short period surface fluctuations (2.48)

Hook and point gauge: A device for measuring the level of a liquid surface, the essential element of which is a pointed rod or hook which can be set with the point at the surface of the liquid (2.50)

Mean depth: The average depth of a stream. It is equal to the cross-sectional area divided by the surface width (2.60)

Sounding Depth of a stream as measured from the surface level to the bed by a sounding device (2.103)

Sounding rod........

 STAT

Sounding rod A portable staff gauge for measuring the depth of a relatively shallow stream (2.104)

Sounding wire or line A flexible wire with a weight attached at its end for determining the depth of a stream (2.106)

Sounding line corrections The corrections to be made to the sounding line measurements to give the true depth. The corrections are made necessary by the deflection of the line due to high stream velocities, great depth, insufficient sounding weight or a combination thereof.

Airline correction: The correction to that part of the sounding line above the water surface (see Fig. 1)

Wet-line correction: The correction to that part of the sounding line below the water surface (see Fig 1)(Replacing 2.1)

Echo sounder: An instrument for measuring the depth of water by the measurement of the time elapsing from the generation of a sounding sequel to the return of its echo which is automatically recorded by the instrument in terms of depth (2.37)

The following terms were considered as part of this sub-section and it was agreed that they should be omitted:-

2.49 Haigh sounder

2.55 Kalvin tube

2.85 Probings

2.132 Water stage recorder.

----

b) Horizontal distances; Sections; Slopes

Gauge line A selected geometric line across a channel, passing through the permanent gauge, approximately at right angles to the general direction of flow (2.44)

Terms omitted:

2.25	Direction peg
2.26	Direction peg line
2.27	Discharge area
2.45	Gauge line pillars
2.47	Gauging stations
2.56	Observation points
2.70	Pendant wire
2.77	Pivot point

STAT

2.80	Normal cross sections
2.81	Pivot point layout
2.82	Pivot point line
2.99	Segment
2.100	Segmentations
2.102	Slope gauges

B. LOCAL VELOCITY METHODS

2. Current meters

Current Meter (Definition to be drafted later)

Propeller type current meter (Moulinet) An instrument to measure the velocity of water by ascertaining the speed of a propeller retated by the stream.

Cup-type current meter (Roue A augets). An instrument to measure the velocity of water by ascertaining the speed of a bucket wheel rotated by the stream.

Rating tank A laboratory tank containing still water for rating current meters, pitot tubes, etc,

----

Terms deleted:-

2.6	Bucket wheel
2.86	Rack and pinion
2.118	Swigel
2.135	Yoke
2.88	Rating curve
2.90	Rating flume
2.16	Commutator

Page Denied

Next 7 Page(s) In Document Denied